Assignment No 11

Optimal Export Policy

1. Assignment Description

To export product in the Green State is a process that takes three quarters. First, marketing efforts must be done, then in the following quarters after orders have been received, these orders are supplied. Payment is accepted two quarters after the process begins. The process is a continuous process. Trust of customers is a result of marketing efforts and a good overseas customer experiences of with the firm's products. Additionally, since at the beginning of the simulation, product quality is not according to customers requirements, , products improvement is required. The aim of this assignment is to build an optimization model for the marketing of products to international markets.

2. Background Theory

The model framework for optimizing export of products is based upon Optimal Control theory. According to this theory the value of the stated variable should be optimized over a range of time using a control variable. Formal representation of the marketing problem is as follows:

$$\sum_{t=1}^{8}[Q_t(P_t,E_t)*P_t - C_t - I_t]*[\frac{1}{(1+r^t)}]$$

s.t.

$$E_t = G(T(C_t) + M_{t-1} + I_{t-1})$$

The target function sums the revenue from the quantity sold less the marketing cost and less the investments in products improvement. The quantity sold is the result of the price and the quality customers assign to the product.

This quality is a result of three components:

- **T(C)** – Total marketing cost including quarter t
- **M** – Level of supply until quarter t-1. This measures if the firm supplied orders from previous quarter
- **I** – Amount of investment until quarter t-1

3. Data Source

- Build a single firm with selected technology and automation
- Generate production of large numbers of products
- Invest in R&D projects for product improvements
- Select and target international markets
- Set prices and marketing efforts for this market
- Run simulations for quarters 1 – 8

4. Analysis Required

1. Estimate the quantity sold in each market based upon the marketing efforts and investment in improvements.
2. Based upon the results, estimate the function G as shown in the background section.
3. Solve the optimization problem as shown in the background section. Based on the solution, find optimal investment, marketing efforts and prices.
4. Check how interest rate influences the solution.